FARMERS' BULLETIN 1175
UNITED STATES DEPARTMENT OF AGRICULTURE

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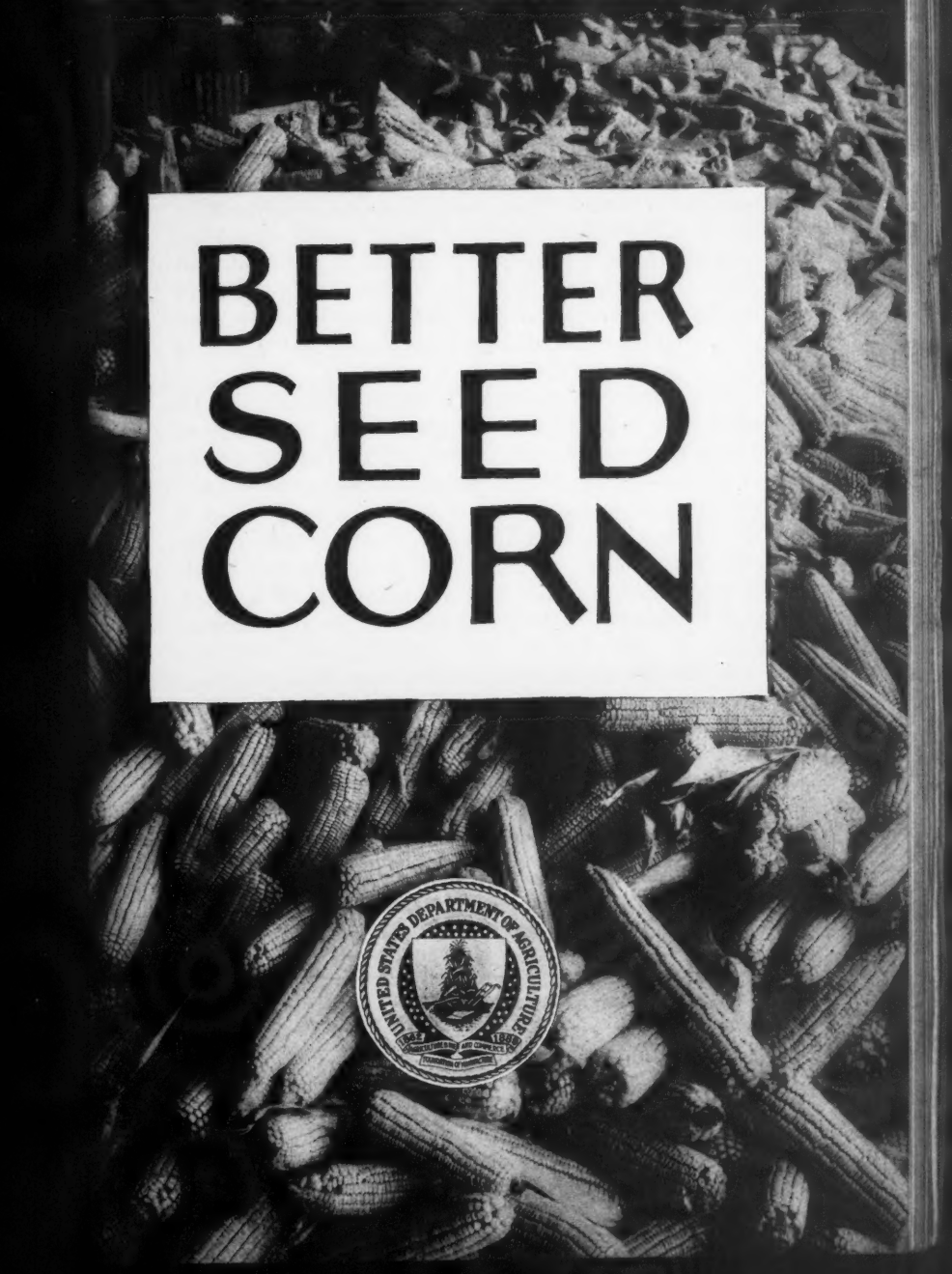
BETTER SEED CORN



CORN YIELDS can be increased more surely and more cheaply by the use of better seed than in any other way.

Seed corn should be selected in the field from stalks which yield best in equal competition with others. It should be of a variety which succeeds well and matures under local conditions. Ears should be saved only from stalks free from disease. Drooping ears which shed rain readily should be selected, and these should be borne on the stalks at a convenient height for husking. In the South, ears which are well protected from insects by a long, tight shuck covering should be chosen.

The same day the seed is gathered it should be hung in a dry, airy place. One of the best ways to cure seed corn is to hang it from the rafters of a barn or open shed. It should not be allowed to freeze before it is thoroughly dry. After it is well cured it should be stored in a dry place where it will remain secure from mice, rats, birds, and insects. Well-cured seed corn will yield a much better crop than seed originally as good but injured through lack of care.

Generally speaking, the seed corn that produces the best crop is the cheapest. Farmers are justified in devoting considerable time to selecting and caring for it or in paying good prices if better seed corn is purchased.

Contribution from the Bureau of Plant Industry
WM. A. TAYLOR, Chief

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BETTER SEED CORN

C. P. HARTLEY,

Agronomist in Charge of Corn Investigations, Office of Cereal Investigations.

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LOW YIELDS DUE TO POOR SEED CAN BE PREVENTED.

THE AVERAGE ACRE YIELD of corn for the entire United States is but 26 bushels, yet in practically every section two or three or even four times that quantity frequently is produced. Improving the quality of the seed corn is one of the surest ways of increasing the yield.

Each spring good seed corn is scarce. This condition is entirely unnecessary, and it is much more serious than is commonly supposed, because many do not fully realize the tremendous loss to themselves and the country caused by planting inferior seed. A full stand may be obtained from inferior seed, but the yield will be lower than good seed would have produced.

The loss is due to delay or negligence. It usually can be prevented by the selection of seed corn in the field in the fall. If good seed corn could be manufactured in a few weeks' time, factories would be working day and night from March until June. Each spring many correspondents inform the United States Department of Agriculture of their willingness to pay good prices for good seed corn and of their inability to obtain it.

THE VERY BEST SEED IS AVAILABLE AT RIPENING TIME.

Autumn is the time to prepare for a profitable corn crop in the following season. This bulletin should prove more valuable and timely than any replies that can be written to springtime correspondents regarding seed corn. Its object is to prevent the scarcity of first-class seed corn each spring. This scarcity can be prevented by

FIG. 1.—U. S. Selection 77 corn in crib in southern Ohio, just as it came from the field. Twenty years of seed selection have greatly increased the productivity of this variety.

selecting a two years' supply of seed when it is most abundant and when the very best can be obtained, at ripening time, before it has been in any way reduced in vitality and productivity. Many let this opportunity pass, expecting to purchase their seed corn, only to

find in the winter or spring that they can not buy at any price as good seed as they could have selected in the autumn. Figure 1 shows a fair sample of what well-bred, well-selected seed corn will produce.

WHERE TO OBTAIN THE BEST POSSIBLE SEED CORN.

Unless a community has its experienced and honest corn breeder, the best place for the farmer to obtain seed corn is from the fields on his farm or in his neighborhood which were planted with a variety that generally has proved successful in the locality.

CORN BREEDING IS A SPECIAL LINE OF WORK.

Some farmers buy all their seed corn, others buy only enough every few years to produce their own seed for main-crop planting. Which is the better plan depends upon whether the farmer can produce as good seed and care for it as well as the person from whom he buys.

Well-conducted corn breeding requires special methods that farmers generally do not have time to apply. If there is in your locality a corn breeder who demonstrates each year the superiority of his corn, you can afford to pay him well for his superior seed. Five dollars a bushel should prove a profitable price for both parties under ordinary conditions. Such corn breeders are improving various kinds of corn, just as cattle breeders are improving various breeds of live stock by breeding from the most profitable individuals.

The general farmer is a producer rather than a breeder of corn. He profits by the careful work of the corn breeder by adopting the higher yielding strains for his general crop. However, he must remember that all the corn grown from the bushel of purchased seed is not necessarily as good for seed as was the original bushel. Some of it may be better, but much of it is likely to be poorer. Corn is constantly producing variations and mutations, and can be improved thereby or allowed to "run out."[1]

WHAT CONSTITUTES GOOD SEED CORN.

Too many people consider seed good simply because it will grow. To be first class, seed must be—

(1) Well adapted to the climatic and soil conditions where it is to be planted.

(2) Of a high-yielding variety and from the high-yielding stalks of that variety.

(3) Well matured and preserved from ripening time till planting time in a manner that will retain its full productivity.

(4) Free from disease and insect injury. Such freedom may indicate resistance to infection.

[1] Those especially interested in the improvement of corn by methods of breeding can receive detailed information upon application to the Secretary of Agriculture.

The importance of these four requirements has been fully demonstrated by experiments. Brief statements of the experimental evidence follow:

(1) During five years 12 well-bred varieties were compared in 10 Northern States, equivalent lots of seed being planted in each State. Varieties that produced most in some States were among the poorest in others.

(2) Seed ears taken from the highest yielding rows of ear-to-row breeding plats have repeatedly produced better than seed ears taken from poorer yielding rows. Seed ears from the highest yielding stalks found in a general field produced better than equally large and good-appearing seed ears taken without considering the inherent productiveness of the parent stalks.

FIG. 2.—A field of corn, showing a good method of selecting seed. The men are searching for plants that have produced heavily under average conditions and in close competition with less productive plants in the same and adjacent hills.

(3) Four hundred ears were divided into two equal lots, one lot being well cared for and the other placed in a barn as corn ordinarily is cribbed. The well-preserved seed produced yields 12 per cent higher on poor soil and 27 per cent higher on fertile soil than that poorly preserved, notwithstanding the fact that both lots of seed germinated equally well.

(4) Diseased ears or apparently healthy ears from diseased shanks or stalks have given lower yields than disease-free ears from normal stalks. Apparently healthy ears were selected and separated by test on a special germinator into actually diseased and disease-free lots. The average acre yield from the ears shown to be diseased was 15 bushels less than that from the sound ears. For a full discussion of the selection of seed corn free from the rot diseases of roots, stalks, and ears, see Farmers' Bulletin 1176.

HOW TO GATHER SEED CORN.

MAKE SEED-CORN GATHERING A SPECIAL TASK.

At corn-ripening time drop all other business and select an abundance of seed corn. The work is too important to be conducted incidentally while husking. When selecting seed corn give it your entire attention and select for the one most important character, the power to yield well. Get the very best that is to be had and dry it promptly, and your increased yields will return you more profit than any other work you can do on your farm.

The only proper way to select seed corn is from the stalks standing where they grew, as soon as the ears are ripe and before the first hard freeze.

FIG. 3.—The three seeds planted in this hill evidently differed in their heritable characters. One ear is erect, permitting water to enter; two are small and too high. In gathering seed, only the large ear at convenient height should be considered.

SELECT ONLY FROM THE BEST-PRODUCING PLANTS.

As soon as the crop matures go through the field with a picking bag (fig. 2)[2] and husk the ears from the stalks that have produced the most good corn without having had any special advantages, such as excess of space, moisture, or fertility. Avoid the large ears on stalks standing singly with an unusual amount of space around them. Preference should be given the plants that have produced most heavily in competition with a full stand of vigorous plants (fig. 3).

[2] The picking bags shown in figure 2 are always open for filling and may be instantly opened at the bottom for emptying.

In all localities the inherent tendency of the plant to produce heavily of sound, dry, shelled corn is of most importance. A well-balanced stalk (fig. 4) bearing two long ears will usually be found to have produced as much grain as any other stalk. Both ears are equally valuable for seed, even though one may be much smaller than the other.

Late-maturing plants with ears heavy because of an excessive amount of sap should be ignored. Sappiness greatly increases the harvest size and weight, but is likely to destroy the quality.

In the Central and Southern States, all other things being equal, short, thick stalks are preferable. They are not so easily blown down and in general are more productive than slender ones.

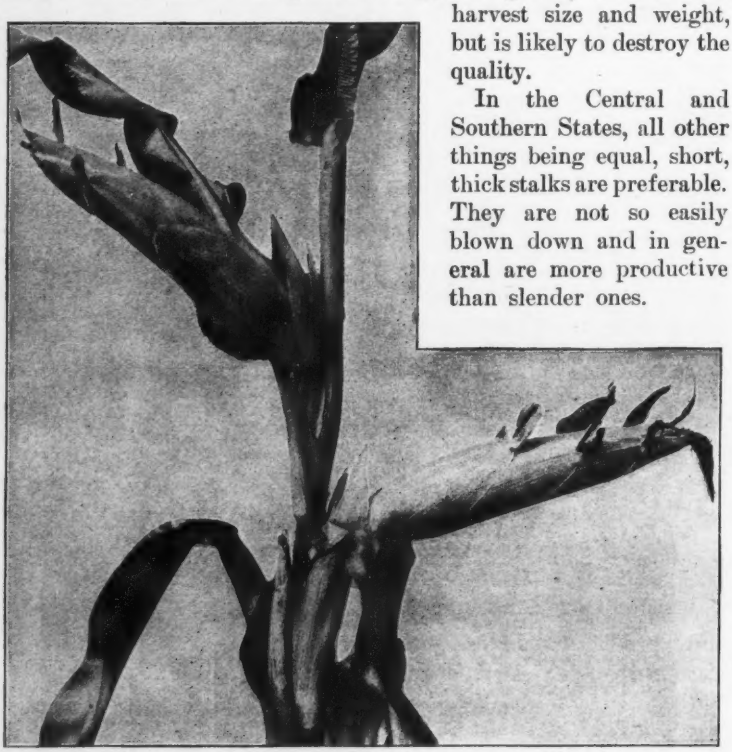

FIG. 4.—The number of ears on the stalk can be controlled by hybridization and by selection. Two ears balance well on a stalk, but a variety should be allowed to vary in the direction in which it yields most abundantly of good grain.

In the more northern States two varieties usually are desirable, an early-maturing variety for grain and a later, ranker growing one for ensilage. Vigorous seed of the ensilage variety usually can be obtained most advantageously from farther south, where it reaches full maturity. Such seed will stand unusually early planting. The ensilage variety should be planted two or three weeks earlier than the variety grown for grain, rather than later, as too often is the

case. When planted in April or early May, ensilage varieties produce much more grain and mature much better than when planted late.

More rapid progress in acclimatizing higher yielding strains in the Northern States would be made if sufficient seed were selected from each well-matured crop to last till the next well-matured crop is obtained.

Our seed selection should be in cooperation with natural selection. "The survival of the fittest" should be recognized and seed selected only from individuals that have reproduced best and most abundantly. Seed should be selected only from individuals which have resisted smut and other harmful diseases.

The tendency to reproduce ears proof against weevils because of long, tight-fitting shucks should be used to advantage when selecting seed in weevil-infested States.

The tendency for corn to produce suckers is hereditary. Other things being equal, seed should be taken from stalks that have no suckers.

TREATMENT OF SEED IMMEDIATELY AFTER GATHERING.

The same day seed corn is gathered the husked ears should be put in a dry place where there is free circulation of air and placed in such a manner that the ears do not touch each other. This is the only safe procedure. The writer has repeatedly seen good seed ruined because it was thought to be already dry enough when gathered and that care in curing was unnecessary. Many farmers believe that their autumns are so dry that such care is not needed. In every locality seed corn gathered at ripening time will be benefited by prompt drying. If left in the husk long after ripening, it may sprout or mildew during warm, wet weather or be injured by freezing.

The vitality of seed often is reduced by leaving it in a sack or in a pile for even a day after gathering. During warm weather, with some moisture in the cobs and kernels, the ears begin to sour or mildew in a remarkably short time.

A good method of drying the seed ears immediately after gathering is shown in figure 5. Ordinarily the best place to hang these strings of ears is in an open shed or loft.

Wire racks, like those shown in figures 6 and 7, are more convenient and in the end cheaper than binder twine or cord. Credit for the idea of making such racks from electrically welded wire fencing is due to a seed-corn company. How to cut the fencing into seed-corn racks without any waste is shown in figure 7. Fencing having

horizontal wires 4 inches apart and upright wires 2 inches apart may be obtained in widths of 2, 3, and 4 feet. Dealers can usually supply such fencing to farmers at an initial cost of about 10 cents

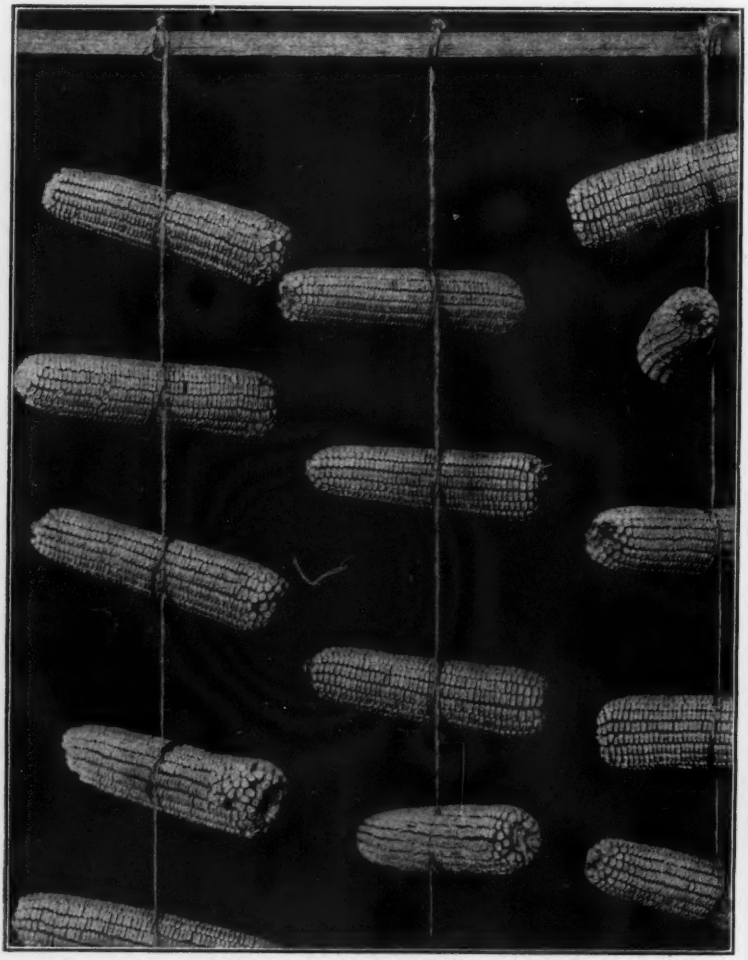

FIG. 5.—A good method of drying seed ears, stringing them immediately after they are gathered and hanging them in a breezy place.

for each bushel of seed suspended. These racks will last many years, and are light and easily stored when not in use. A wooden rack is shown in figure 8.

Fire will be necessary only during unusually damp weather at seed-gathering time. If heat is employed in a poorly ventilated

room it will do the seed ears more injury than good. If used, the fire should be slow, long continued, and situated below the seed ears, with good ventilation above them. The seed ears should not be allowed to freeze unless they are thoroughly dry.

WINTER STORAGE OF SEED CORN.

After hanging in the shed or lying on the racks for two months, the seed ears should be "dry as a bone" and contain less than 10 per cent of moisture. They can remain where they dried or be stored in mouse-proof barrels, boxes, or crates during the winter, but in either case must not be exposed to a damp atmosphere or they will absorb moisture and be injured. Some farmers place the thoroughly dried seed ears in the center of a bin and fill with loose dry wheat or oats. This protects the ears from rats and mice.

FIG. 6.—Seed ears suspended by means of wire racks made from electrically welded fencing. Figure 7 shows how to cut these racks.

PREVENTING INJURY BY WEEVILS OR GRAIN MOTHS.

If at any time signs of weevils or grain moths show on the dry seed ears they should be inclosed with carbon bisulphid in practically air-tight rooms, bins, boxes, or barrels for 48 hours. The bisulphid should be placed in shallow dishes or pans on top of the seed. A half pint is sufficient for a box or barrel holding 10 bushels or less. One pound is sufficient for a room or bin 10 feet each way. After fumigation the ears should be thoroughly aired, taking care that no fire is present when the fumigating box is opened, as the gas is explosive.

In localities where weevils and grain moths injure stored grain, the thoroughly dry seed ears should be stored in very tight mouse-proof receptacles, with 1 pound of moth balls or naphthalene inclosed for each bushel of corn. This quantity tightly inclosed with the corn will prevent damage from those insects and will not injure the seed.

The material will cost about 10 cents a pound. One dollar's worth will protect seed enough to plant 60 acres.

TESTING THE GERMINATION OF SEED CORN.

Seed corn that matured normally and has been properly preserved will grow satisfactorily. It is very poor management to neglect

proper preservation and to spend time in the spring separating by germination tests those ears that have been badly damaged from those that have been slightly damaged. Prevention is better than cure, and in this case a cure is impossible.

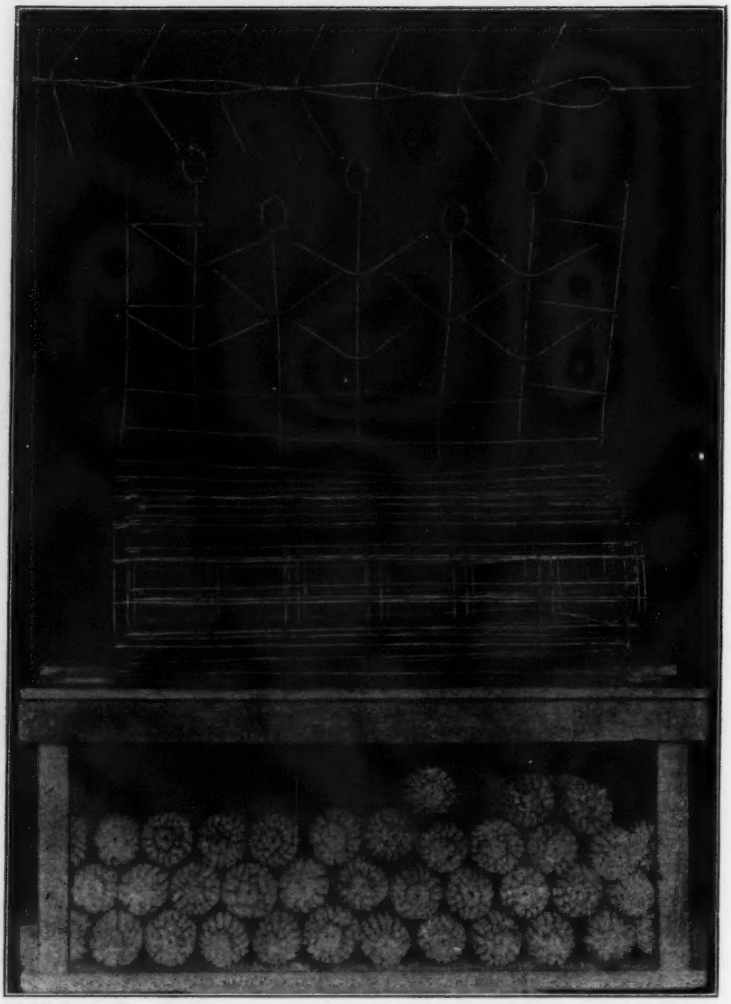

FIG. 7.—Seed corn racks made from electrically welded wire fencing, showing the method of construction; also a mouse-proof crate for storing seed corn in winter.

Ears slightly damaged by poor preservation may germinate 100 per cent, but will produce less than if they had received better care.

Make a seed-corn testing box or rag-doll tester and test 100 ears separately. Be sure that each kernel tested is perfect in appearance

and was not injured at the tip when removed from the ear. If three or more kernels out of ten from any ear fail to grow it will be advisable to test every ear before planting. If the seed has been properly selected and preserved, the 100 ears tested will seldom reveal any poor ones, and further testing of the supply will be unnecessary.[3]

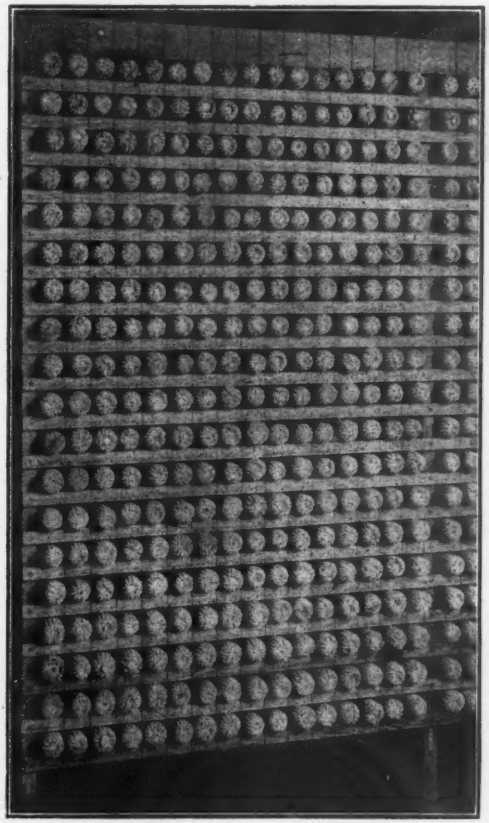

FIG. 8.—A good rack for drying seed corn.

GRADING SEED CORN.

Shelled corn is difficult to grade satisfactorily. The grading can be done better before the ears are shelled. If the seed ears vary greatly in size of kernels, they should be separated into two grades. These grades should be shelled separately, tried in the corn planter, and numbered to correspond with the number on the planter plates found to drop them most uniformly. These arrangements can be completed before the rush of spring work begins. The kernels of varieties of corn differ widely in size and shape, as shown in figure 9.

METHODS OF SHELLING.

SEED EARS SHOULD FIRST BE NUBBED.

The first operation in properly shelling seed corn is the removal of the small kernels from the tips of the ears and the round, thick

[3] Complete directions for testing seed corn are given in Farmers' Bulletin 948, entitled "The Rag-Doll Seed Tester."

kernels from the butts. The small tip kernels are less productive than the other kernels of the ear. The round butt kernels are as productive as the other kernels of the ear, but do not drop uniformly in a planter.

HAND SHELLING IS THE BEST METHOD.

Shelling seed corn carefully by hand is profitable. The greater the acreage planted, the greater the profit. Each ear should be

FIG. 9.—Corn kernels vary widely in size and shape. Some of the variations are shown here. Upper row (left to right), two kernels each of Pearl pop corn and Stowell Evergreen, Country Gentleman, and Black Mexican sweet corn. Second row, two yellow and two white kernels of Cuzco corn from Peru. The remaining kernels in this row and those in the third and fourth rows show variations in size and shape of kernels common to most corn-belt varieties. Uniformity in size and shape facilitates accurate machine planting. Equally good varieties may have kernels totally different in size and shape.

shelled separately into a sieve,[4] rejecting any worm-eaten or blemished kernels. If the supply from the one ear appears good and contains no poor kernels, it is poured into the general supply and another ear is shelled in the same way.

[4] A large sieve with quarter-inch mesh and a concave bottom screens the chaff from the kernels and is easily emptied.

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